# CRAVE Science Goals

- Investigate the TTL ozone budget
- Investigate the TTL water vapor budget
- Investigate convective and large-scale transport of water vapor and other trace gases in the UT/LS region
- Investigate the properties of high anvil cirrus and in situ TTL cirrus
- Measure UT/LS concentrations of short-lived halogen species
- Investigate UT/LS aerosol composition and TTL NAT particles

# Specific Flight Objectives

- Survey TTL air with a variety of regional origins and convective influence histories
- Sample very cold TTL air
- Measure water vapor and total water isotopes in the UT/LS region
- Sample air that has recently experienced very cold temperatures in the western Pacific
- Sample air recently influenced by deep tropical convection
- Sample the tops of high tropical anvil cirrus
- Sample thin cirrus formed in situ in the TTL

# Aura Validation Priorities

- TES
  - scanning HIS coincident with ozonesondes, contrasting geophysical conditions
  - two flights with clear-sky, over-ocean coincidence between S-HIS and TES (level flight along TES track required for comparisons with S-HIS, CAFS, and CPL)
  - 8 km to max alt $HNO_3$ profiles
  - cloud-free (at and above a/c) profiles down to 500 mbar
  - HDO measurements at 500 mbar
- OMI
  - long, level tropopause legs: clean air over ocean and polluted air downwind of cities
  - spatial variability of $NO_2$ column (ACAM)
  - atmospheric pollution measurements: $NO_2$, $SO_2$, aerosols, HCHO
  - spirals into BL under pristine and polluted conditions

# Aura Validation Priorities continued

- HIRDLS
  - coincident species profiles (10 km to max alt, clear LOS)
  - long legs with CPL measurements over clouds
  - tropopause H2O measurements under very dry, cold conditions
  - HIRDLS coincidence with H2O and $O_3$ sondes
- MLS
  - coincident COSSIR and CRS IWP and IWC measurements
  - in situ measurements of IWC and size distribution in thick cirrus
  - $H_2O$: profiles from 50 to 500 hPa coincident with frostpoint sondes
  - stacked flights along track to address horizontal variability issues
  - validation of strong CO variability
  - ozone columns from CAFS